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EXAMINER	
COLEMAN, KEITH A	

ART UNIT	PAPER NUMBER
3747	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/551,825	ROBINET, CYRIL	
	Examiner	Art Unit	
	KEITH COLEMAN	3747	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 September 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

Claims 17-23 objected to because of the following informalities: In claim 17, it states a method, but upon further observation, the claim subject matter mirrors claims 1-16. In addition claims 17-23, the claim language lack "steps" as required in a method claim. Appropriate correction is required. To further prosecution and in view of the similar (nearly identical) subject matter, claims 17-23 are interpreted as an apparatus.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-8 and 10-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morikawa (US Patent No. 6,138,638) in view of Bertsch et al. (US Patent No. 6,543,409) and Pfaeffle et al. (US Patent No. 6,752,126)

With regards to claims 1 and 17, the patent to Morikawa discloses all the limitations of the claimed subject matter, including one cylinder (2,12, Col. 29, Lines 35-37), a cylinder head (2, Col. 29, Line 35) closing the cylinder (12, Col. 29, Lines 35-37), means (13, Col. 29, Line 35) for injecting gasoline (Col. 29, Line 11), ignition means (via spark plug 14, Col. 31, Line 42) intended to produce an ignition (Col. 29, Lines 35-42) of the air-gasoline mixture in the combustion chamber (12), intake valves (See Figure 19, near 2a, Col. 29, Line 17) and exhaust valves (See Figure 19, near 2b, Col. 29, Line 17) selectively closing the combustion chamber (12), an injection pump (24, Col. 29, Line 54) intended to supply pressurized gasoline to the **injection means** (13), except wherein the pressure of the gasoline supplied to the **injection means** is above 250 bars, and in that, at least in an operation range of the engine subject to the clicking phenomenon, the amount of gasoline supplied by the pump to the injection means for a

combustion cycle is fractionated in the form of a plurality of partial and distinct injections, and in that at least one of these partial injections is delivered before ignition of the load in the combustion chamber by the ignition means, and at least one partial injection is delivered after this ignition. As to a piston (not shown) slidingly arranged in the cylinder (12), a combustion chamber (12, Col. 29, Lines 35-37) defined in the cylinder (2, 12) between an upper face of the piston (not shown) and a lower face of the cylinder head (2), even though Morikawa does not positively disclose a piston, it is inherent that a piston in located in the combustion chamber (12). In addition, Bertsch et al. discloses wherein the pressure of the gasoline supplied to the **injection means** (1) is above 250 bars (Col. 2, Lines 17-20), and in that, at least in an operation range of the engine subject to the clicking phenomenon (i.e. knocking, Col. 1, Line 44, Col. 1, Lines 60-65), the amount of fuel supplied to the injection means (1, Col. 3, Line 10) for a combustion cycle is fractionated in the form of a plurality of partial and distinct injections (Col. 1, Lines 50-55), and in that at least one of these partial injections is delivered before ignition of the load (Col. 2, Line 3) in the combustion chamber (2, Col. 3, Line 17) by the ignition means (3, Col. 3, Line 3), and at least one partial injection is delivered after this ignition (Col. 2, Line 3). In addition, since Morikawa discloses a combustion cycle (See Figures 14-16) showing every position and stroke (including an operation range of the engine subject to the clicking phenomenon or knocking) and a cylinder-direct-injection gasoline engine (Col. 29, Line 11) and Bertsch et al. discloses solving the problem of misfires (i.e. knocking, Col. 1, Lines 44), it would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide the fuel

injection system of Morikawa with wherein the pressure of the gasoline supplied to the **injection means** is above 250 bars in an engine operating range subject to the clicking phenomenon and the amount of gasoline supplied by the pump to the injection means for a combustion cycle is fractionated in the form of a plurality of partial and distinct injections, and furthermore, these partial injections are delivered before ignition of the load in the combustion chamber, and at least one partial injection is delivered after this ignition in view of the teaching to Bertsch et al., in order to insure fuel is injected in a defined manner (Col. 1, Lines 55-60)

As to the new limitation of "during a combustion cycle", the patent to Kohler et al. states on Col. 3, Lines 14-23 that "Often **the injection during one metering cycle is divided into a plurality of partial injections**. Usually, at least one or two pre-injections, a main injection, and an after-injection are provided," It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the injection timing of Morikawa with wherein the injections occurred during a combustion cycle in view of the teaching to Pfaeffle et al., in order to correct the fuel quantity to be injected (Col. 2, Lines 1-10 from Pfaeffle et al.)

With regards to claim 8, the patent to Morikawa discloses wherein the engine has a four-stroke combustion cycle (See Figures 15 and 16, Col. 29, Lines 10-11).

With regards to claim 10, the patent to Morikawa discloses wherein the engine (1, Col. 29, Line 19) is a direct injection engine (Col. 29, Line 11).

With regards to claim 11, the patent to Morikawa discloses all the limitations of the claimed subject matter, except positively disclosing wherein the partial injection or injections injected before the ignition are delivered by the pump in a time interval close to the combustion high dead center. However, Bertsch et al. discloses wherein the partial injection or injections injected before the ignition are delivered in a time interval close to the combustion high dead center (i.e. TDC, Col. 1, Lines 50-55, Col. 1, Lines 65-67 through Col. 2, Lines 1-5). In addition, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide the fuel injection means system of Morikawa with wherein the partial injection or injections injected before the ignition are delivered by the pump in a time interval close to the combustion high dead center in view of the teaching to Bertsch et al., in order to insure fuel is injected in a defined manner (Col. 1, Lines 55-60 from Bertsch et al.).

With regards to claims 2 and 18, the combination of Morikawa and Bertsch et al. discloses all of the claimed subject matter except positively disclosing wherein the amount of gasoline injected before the ignition is comprised between 20 to 50% of the total amount of gasoline injected for the combustion cycle concerned. Since Bertsch et al. discloses percentages between 70% to 99% and 80% to 99% (Col. 1, Line 63), it would have been obvious to one of ordinary skill in the art at the time the invention was made to further provide the amount of gasoline injected before the ignition being between 20 to 50% of the total amount of gasoline injected for the combustion cycle

concerned because this procedure will insure fuel is injected in a defined manner (Col. 1, Lines 55-60 from Bertsch et al.) and is invariably a change in range. See MPEP 2144.04. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) (Claimed process which was performed at a temperature between 40°C and 80°C and an acid concentration between 25% and 70% was held to be *prima facie* obvious over a reference process which differed from the claims only in that the reference process was performed at a temperature of 100°C and an acid concentration of 10%.); see also *Peterson*, 315 F.3d at 1330, 65 USPQ2d at 1382 ("The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages.")

With regards to claims 3, 4, 17, 19, and 20, the patent to Morikawa discloses all the limitations of the claimed subject matter, including wherein the amount of gasoline (Col. 29, Line 11) delivered by the pump (24, Col. 29, Line 54) to the **injection means** (13, Col. 29, Lines 35-36) for a combustion cycle (See Figures 14-16), except the combustion cycle comprises, before ignition of the load, between one and ten distinct partial injections. However, Bertsch et al. discloses the combustion cycle comprises, before ignition of the load, between one and ten distinct partial injections (Col. 1, Lines 10-12). It would have been obvious to a person of ordinary skill in the art at the time the

invention was made to provide the fuel injection means system of Morikawa with a combustion cycle comprising, before ignition of the load (Col. 2, Lines 1-5), between one and ten distinct partial injections in view of the teaching to Bertsch et al., in order to insure fuel is injected in a defined manner (Col. 1, Lines 55-60 from Bertsch et al.).

With regards to claim 5 and 21, the combination of Bertsch et al. and Morikawa discloses all the limitations of the claimed subject matter, including Bertsch et al. disclosure of the amount of fuel delivered the **injection means** (1, Col. 3, Line 10) for a combustion cycle is fractionated in the form of a plurality of partial and distinct injections (Col. 1, Lines 50-60) and Morikawa's disclosure of using engine speed (NE, Col. 51, Lines 36-38) as an parameter to calculate fuel injection quantities, except positively disclosing when the engine speed is comprised between 750 and 4,500 revolutions/min approximately, and preferably between 1,000 and 4,000 revolutions/min, the amount of gasoline delivered by the pump to the injection means for a combustion cycle is fractionated in the form of a plurality of partial and distinct injections. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the fuel injection system of either Morikawa or Bertsch et al. inject fuel when the engine speed reached a range between 750 and 4,500 revolutions/min approximately, and preferably between 1,000 and 4,000 revolutions/min because this procedure will insure fuel is injected in a defined and correct manner (Col. 1, Lines 55-60 from Bertsch et al.) and is invariably a change in range. See MPEP 2144.04. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) (Claimed process which was performed at

a temperature between 40°C and 80°C and an acid concentration between 25% and 70% was held to be *prima facie* obvious over a reference process which differed from the claims only in that the reference process was performed at a temperature of 100°C and an acid concentration of 10%.); see also *Peterson*, 315 F.3d at 1330, 65 USPQ2d at 1382 ("The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages.")

With regards to claims 6 and 22, the combination of Bertsch et al. and Morikawa discloses all the limitations of the claimed subject matter, including Bertsch et al disclosure of wherein the amount of fuel delivered to the **injection means** (1, Col. 3, Line 10) for a combustion cycle (Col. 3, Line 15) is delivered in the form of a single injection or fractionated in the form of a plurality of partial and distinct injections (Col. 1, Lines 50-60) and Morikawa's disclosure of using engine speed (NE, Col. 51, Lines 35-37) as an parameter to calculate fuel injection quantities and also a combustion cycle (See Figures 14-16), except positively disclosing when the engine is in a so-called high speed range of operation, comprised for example between 4,000 and 7,000 revolutions/min, the amount of gasoline delivered by the pump to the injection means for a combustion cycle is delivered in the form of a single injection or fractionated in the form of a plurality of partial and distinct injections. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the fuel injection system of either Morikawa or Bertsch et al. inject fuel when the engine speed reached a

range between 4,000 and 7,000 revolutions/min or high speed range of operation because this procedure will insure fuel is injected in a defined and correct manner (Col. 1, Lines 55-60 from Bertsch et al.) and is invariably a change in range. See MPEP 2144.04. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) (Claimed process which was performed at a temperature between 40°C and 80°C and an acid concentration between 25% and 70% was held to be *prima facie* obvious over a reference process which differed from the claims only in that the reference process was performed at a temperature of 100°C and an acid concentration of 10%.); see also *Peterson*, 315 F.3d at 1330, 65 USPQ2d at 1382 ("The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages.")

With regards to claims 7 and 23, the combination of Bertsch et al. and Morikawa discloses all the limitations of the claimed subject matter, including Bertsch et al disclosure of wherein the amount of fuel delivered to the **injection means** (Col. 1, Line 10) is delivered in the form of an injection of short duration, i.e., of a duration comprised between ten and one hundred degrees crankshaft approximately (Col. 1, Lines 64-67).

With regards to claims 12, 15, and 16, the combination of Bertsch et al. and Morikawa discloses all the limitations of the claimed subject matter, including Bertsch et al disclosure of the pressure of the fuel supplied to the **injection means** (1, Col. 3, Line

10) is comprised between 250 and 2,500 bars, and, preferably, between 300 and 2,000 bars (Col. 2, Lines 17-20, Col. 3, Line 32).

With regards to claim 13, the combination of Bertsch et al. and Morikawa discloses all the limitations of the claimed subject matter, including Bertsch et al disclosure of wherein the pressure of the fuel supplied to the **injection means** (1) is comprised between 300 and 2,000 bars (Col. 2, Lines 17-20, Col. 3, and Line 32).

With regards to claim 14, the combination of Bertsch et al. and Morikawa discloses all the limitations of the claimed subject matter, including Bertsch et al disclosure of the amount of fuel delivered to the injection means (1, Col. 3, Line 10) for a combustion cycle (Col. 3, Line 15) is delivered in the form of a single injection or fractionated in the form of a plurality of partial and distinct injections (Col. 1, Lines 50-60) and Morikawa's disclosure of using engine speed (NE, Col. 51, Lines 35-37) as an parameter to calculate fuel injection quantities and also a combustion cycle (See Figures 14-16), except positively disclosing wherein, when the engine speed is comprised between 1,000 and 4,000 revolutions/min, the amount of gasoline delivered by the pump to the injection means for a combustion cycle is fractionated in the form of a plurality of partial and distinct injections. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the fuel injection system of either Morikawa or Bertsch et al. inject fuel when the engine speed reached a range between 1,000 and 4,000 revolutions/min because this procedure will insure fuel

is injected in a defined and correct manner (Col. 1, Lines 55-60 from Bertsch et al.) and is invariably a change in range. See MPEP 2144.04. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) (Claimed process which was performed at a temperature between 40°C and 80°C and an acid concentration between 25% and 70% was held to be *prima facie* obvious over a reference process which differed from the claims only in that the reference process was performed at a temperature of 100°C and an acid concentration of 10%.); see also *Peterson*, 315 F.3d at 1330, 65 USPQ2d at 1382 ("The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages.")

5. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Morikawa (US Patent No. 6,138,638) and Bertsch et al. (US Patent No. 6,543,409) as applied to claim 1 above, and further in view of Bassot (US Patent No. 3,526,212).

With regards to claim 9, the combination of Morikawa and Bertsch et al. discloses all the limitations of the claimed subject matter except wherein the engine is an indirect injection engine. Bassot discloses wherein the engine is an indirect injection engine (Col. 1, Lines 5-10). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the direct fuel injection system of either Morikawa or Bertsch et al. with an indirect fuel injection system in view of the teaching to Bassot, in order to obtain the desired regulation of the motor (Col. 1, Line 46).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Zillmer et al. (US Patent No. 7,278,392) shows the current state of the art.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KEITH COLEMAN whose telephone number is (571)270-3516. The examiner can normally be reached on 5:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Cronin can be reached on (571)272-4536. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KAC
/K. C./
Examiner, Art Unit 3747

/Stephen K. Cronin/
Supervisory Patent Examiner, Art Unit 3747